Polarization diversity and wavelength monitoring in BCB-bonded InP-membranes.

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Coupling to fiber is an important problem for future optical communication networks. The large mismatch between the optical fiber mode and the waveguide mode on a chip, induces large coupling losses. Miniaturizing components, in order to integrate many functions on a single chip, makes the problem even more difficult. An attractive solution is the use of grating couplers, since they open the way for wafer-scale testing. We have demonstrated compact and highly efficient grating couplers in BCB-bonded InP-membranes. Coupling efficiencies of 56% to standard single mode fiber were demonstrated for a 10x10 μm^2 grating with a gold mirror under the grating. When using 2D-grating couplers, polarization independent operation can be obtained through polarization diversity. We have recently demonstrated this approach, resulting in a measured polarization dependent loss of around 1 dB for grating couplers in InP-membranes.

These gratings will be integrated with a photonic crystal (PhC) based wavelength monitor and photodetectors. A detailed fabrication scheme has been worked out and first fabrication steps have been carried out.

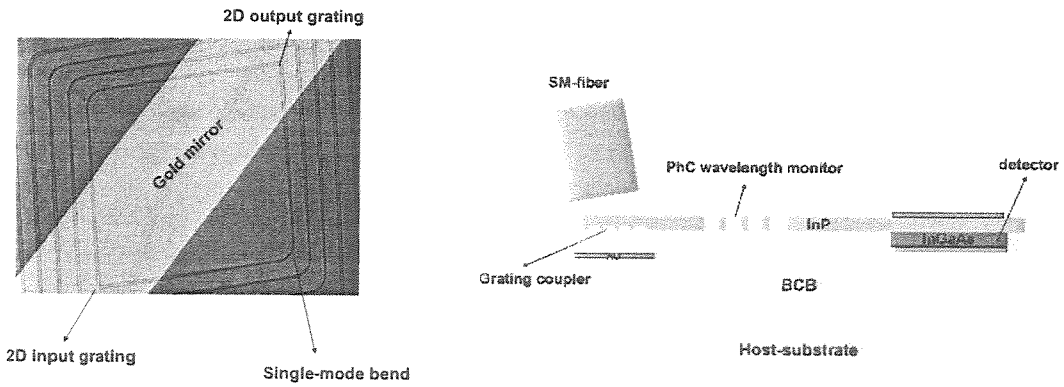

Fig.1. (left) 2D-grating couplers in a polarization diversity scheme. (right) Schematic view of the integration of grating couplers with wavelength monitor and photodetectors.

Applications of Photonic Integration

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27. **Christian Koos:** Ideal Contour Trajectories for Low-Loss Waveguide Bends
28. **Antonio La Porta:** Design of an integrated multiwavelength laser with RF optical modulator for burst-mode transmitters in packet-switching based metropolitan area networks
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50. Benjamin Rudin: First Demonstration of a Modelocked Integrated Absorber External-Cavity Surface Emitting Laser (MIXSEL)
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53. Yaocheng Shi: Carrier lifetimes in dry-etched InP-based photonic crystals
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61. Ruth Thompson: Ultra-Compact Integrated Interferometeric Devices for Pulse Regeneration
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66. Yongqiang Wei: 10 Gb/s modulation of 1.3 um GaInNAs lasers up to 110 °C
67. Christopher Wiesmann: Altering the Radiation Pattern of Light Emitting Diodes by 2D Photonic Crystals
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